MXF

Mastering Format Project

AMWA/DTG MXF Summit 2007

Advanced Media Workflow Association

Putting AAF and MXF to Work

Advanced Media Workflow Association

AMWA promotes the development and adoption of open, accessible standards and specifications relating to file-based workflows (including AAF, MXF and other formats), Service Oriented Architectures, and Application Specifications

The AMWA, is developing workflow solutions in several areas:

- **Production**
- **Post Production**
- **Mastering**
- **Preservation Archiving**
- **Program Distribution**

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Putting AAF and MXF to Work

www.amwa.tv

The Problem…

- **Interchange incompatibility between disparate manufacturers/users**
- **Complexity of implementation causes increases in both time to market and systems costs**
- **Metadata support throughout the chain is vital. Historically metadata may have been lost and reentry required. Metadata is the key to automating the process**
- **Costs increase when content owners have to create separate production chains for each output format**

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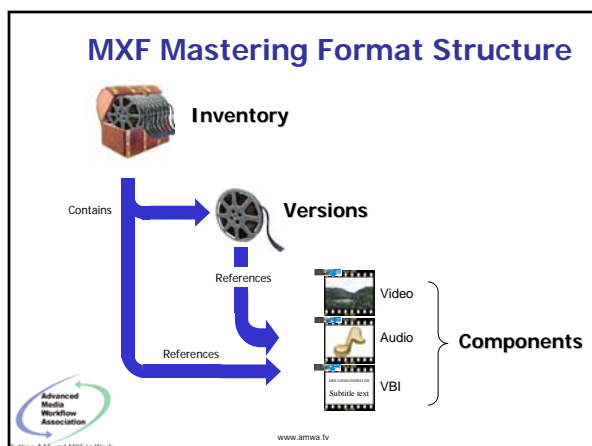Putting AAF and MXF to Work

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The MXF Mastering Format Project

Mastering in this context means the process of receiving a program, ingesting, repurposing and preparing file based versions for distribution

- **Open - Vendor Independent Industry Initiative**
- **Set of file specifications leveraging existing standards**
- **A proposed MXF API**
- **A proposed controlled subset of MXF options for a specific user application space**

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MXF Mastering Format Structure

Inventory

Contains

Versions

References

Video

Audio

VBI

Subtitle text

References

Components

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What MXF options need to be controlled ?

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The Concept

Vendor Independent solution:

- multi-vendor interchange
- Facilitates the creation of different versions from one program master (family viewing, adult viewing, additional language versions)
- Enables the efficient repurposing of content to many different platforms (SD, HD, Mobile phone, Web, IPTV, Broadband, DVD, etc.)
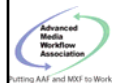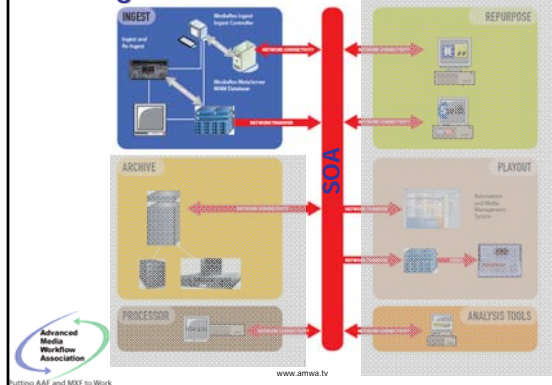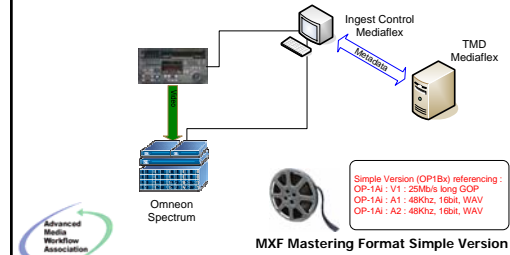

Concept Overview
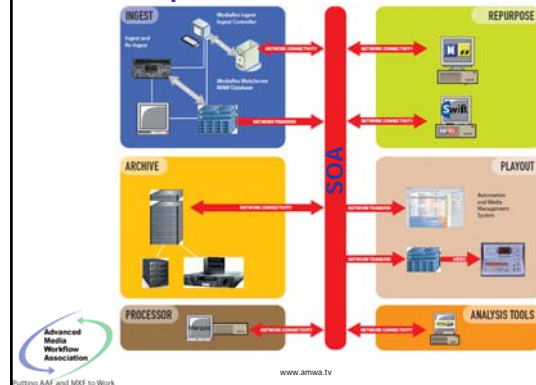
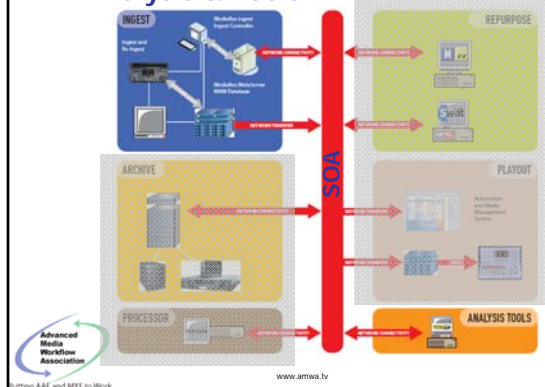## Ingest

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Ingest

- **Ingest of a tape triggers the initial MXF Master file creation and inserts metadata**

Ingest Control Mediaflex

TMD Mediaflex

Metadata

Omneon Spectrum

Simple Version (OP1Bx) referencing :
OP-1Ai : V1 : 25Mb/s long GOP
OP-1Ai : A1 : 48Khz, 16bit, WAV
OP-1Ai : A2 : 48Khz, 16bit, WAV

MXF Mastering Format Simple Version

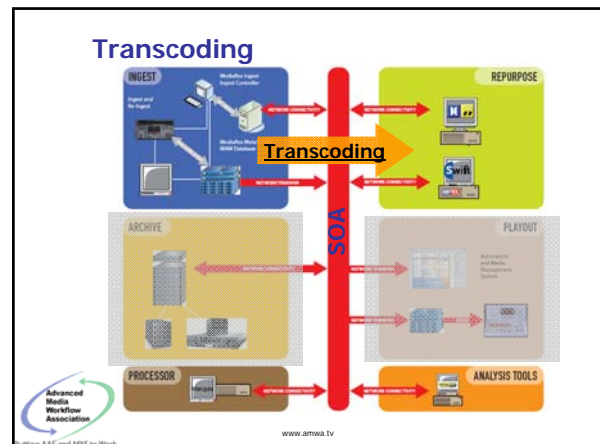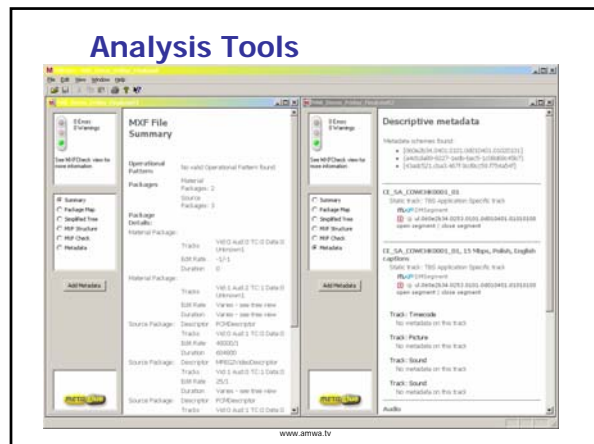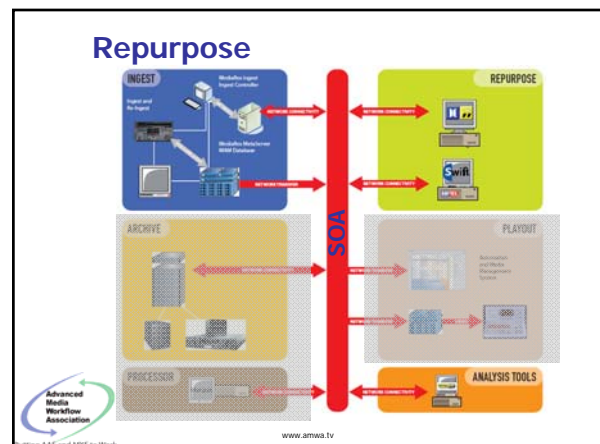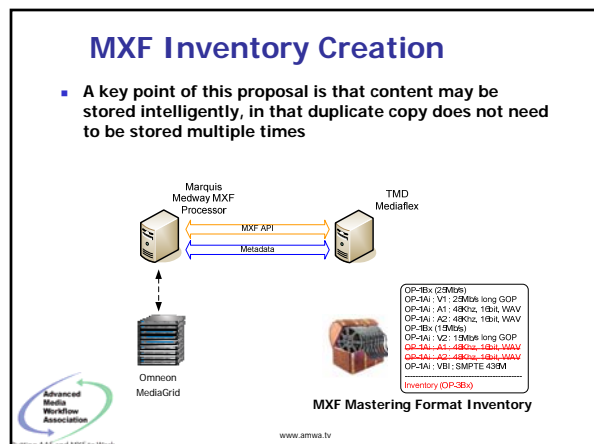## Analysis & Tools

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Analysis Tools

- These are good things – we need them badly
- Currently test tools from different vendors yield inconsistent results using same file
- MXF Mastering Format proposal eliminates ambiguity, allowing for uniform testing of files and metadata
- A challenge to the industry is to simplify test tools and to provide testing on a continuous basis throughout the process

Analysis Tools

Transcoding

Transcoding

Transcoding

- Transcoding is a common process which is critical to repurposing of content.

Mediaflex Control

Snell & Wilcox ICR

TMD Mediaflex

MXF API

Omneon Spectrum

Two Simple Versions

OP-1Bx (25Mb/s)
OP-1Ai : V1 : 25Mb/s long GOP
OP-1Ai : A1 : 48Khz, 16bit, WAV
OP-1Ai : A2 : 48Khz, 16bit, WAV

OP-1Bx (15Mb/s)
OP-1Ai : V2 : 15Mb/s long GOP
OP-1Ai : A1 : 48Khz, 16bit, WAV
OP-1Ai : A2 : 48Khz, 16bit, WAV
OP-1Ai : VBI : SMPTE 436M

MXF Mastering Format Simple Versions

MXF Processing Functions

- Create a Version
- Create an Inventory
- Append components to a Version/Inventory
- Move or Copy a Version/Inventory
- Delete a Version/Inventory
- Delete a component from within a Version/Inventory
- Extract one or more components from a Version/Inventory
- Interrogate a Version/Inventory
- Manage the activities

MXF Inventory Creation

- A key point of this proposal is that content may be stored intelligently, in that duplicate copy does not need to be stored multiple times

Marquis Medway MXF Processor

TMD Mediaflex

MXF API

Metadata

Omneon MediaGrid

OP-1Bx (25Mb/s)
OP-1Ai : V1 : 25Mb/s long GOP
OP-1Ai : A1 : 48Khz, 16bit, WAV
OP-1Ai : A2 : 48Khz, 16bit, WAV
OP-1Bx (15Mb/s)
OP-1Ai : V2 : 15Mb/s long GOP
OP-1Ai : A1 : 48Khz, 16bit, WAV
OP-1Ai : A2 : 48Khz, 16bit, WAV
OP-1Ai : VBI : SMPTE 436M

Inventory (OP-3Bx)

MXF Mastering Format Inventory

Repurpose

Repurpose

- **Different opening and closing credits**
- **Pre/post watershed versions**
- **Web/mobile versions**
- **Different language tracks and subtitling**
- **And on and on**........

Metadata Example

Audio track
Metadata track

RFC 4646
(ISO 639 ++)

Annotation Language	en-US
Spoken Language	en-GB
Full Spoken language	en-GB-x-DolbyE-a-PostWatershed
Description	Dolby E surround track with profanity

VBI track
Metadata track

RFC 4646
(ISO 639 ++)

Annotation Language	en-US
Spoken Language	gr-Grek
Full Annotation	gr-Grek
Description	Greek subtitling for use in Greece

Playout

Playout

- **A playout system can work with an asset manager to extract a specific version required for air**
  - **Playout server can extract instructions from the MXF Inventory file which say how the French version should be played**
  - **These instructions are used create the version that plays to air**

Archive

Process Benefit example

Archive — Central Storage — Add components — Playout Server — Distribution

Rewrite tape to archive new version

Copy back entire file

Interleaved files

component files

Archive — Central Storage — Add components — Playout Server — Distribution

Append only new component files to archive version

Copy only the new component files

The Big Picture...

- We had a need to reduce the cost of producing multiple versions of content
- We were successful in meeting this need using a well specified subset of MXF
- It works!!
- But...
  - This is still a work in process. This is an open initiative; we want your participation and input
- And...

Please get involved

Next Steps

- The MXF Mastering Format is a project in process with the Advanced Media Workflow Association (documents available to members on the Web site www.amwa.tv)
- We are soliciting comments on this specification. The proposal will be revised based upon comments received

Demonstration Partners

Thank You!
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